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## RESEARCH MEMORANDUM

### SPECIALIZED SKILL TRAINING AND PERSONNEL RETENTION AS FACTORS IMPACTING TRAINING COSTS: SUMMARY REPORT

Aline O. Quester

*A Division of*

**CNA**

*Hudson Institute*

**CENTER FOR NAVAL ANALYSES**

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1. Enclosure (1) is forwarded as a matter of possible interest.
2. This research memorandum is a summary of factors that affect the cost of enlisted specialized skill training. The detailed findings are contained in several earlier CNA publications; this memorandum summarizes those findings, highlighting the more important patterns and trends.

*Robert F. Lockman*  
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Director  
Manpower Program

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## SPECIALIZED SKILL TRAINING AND PERSONNEL RETENTION AS FACTORS IMPACTING TRAINING COSTS: SUMMARY REPORT

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## ABSTRACT

This research memorandum is a summary report of a CNO-directed study of the factors that affect the costs of training Navy personnel. It focuses on the relationship between retention and specialized skill training for enlisted personnel on the expectation that increased retention could be expected to reduce training requirements and costs. Other detailed findings of the study are contained in several earlier CNA documents; this memorandum summarizes those findings, highlighting the more important patterns and trends.

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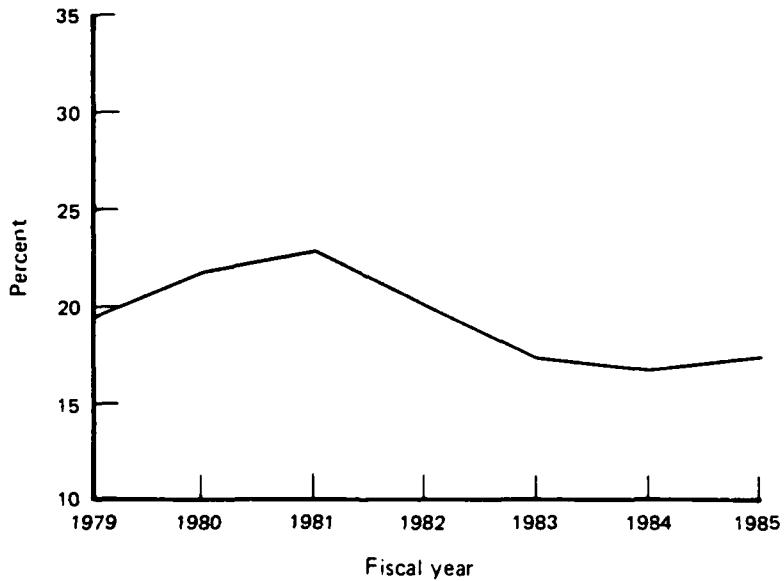
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## INTRODUCTION

At the request of the Chief of Naval Operations (CNO), CNA was tasked to study factors impacting the training costs of Navy personnel. The primary concern was the relationship between retention and specialized skill training for enlisted personnel. In particular, why had enlisted training appeared to increase as retention increased in the 1980s? Between FY 1979 and FY 1985, average enlisted active-duty endstrength increased by about 10 percent (458,000 to 503,000). Most of this growth was a result of improved retention. The number of accessions peaked in 1981 and 1982. Although accessions in 1986 will be almost 10,000 more than in 1985, they will still be below the 1981 or 1982 numbers. Accessions as a percent of endstrength are depicted in figure 1. In 1981, enlisted accessions were 23 percent of enlisted endstrength; in 1985, 17 percent. The CNO's observation that the period had shown an increasing proportion of careerists was correct.

The study team approached the topic with two general objectives. One was to construct an internally consistent historical series for specialized skill training costs. The other was to construct a historical data base for the numbers and types of enlisted personnel undergoing specialized training. Financial responsibility for training had changed in the 1980s, and thus the raw historical budget data might not accurately portray how the costs of training were changing.



**FIG. 1: ACTIVE-DUTY ENLISTED ACCESSIONS  
(AS A PERCENT OF ENDSTRENGTH)**

Creating a functionally consistent historical training cost series required the identification of training costs located in many parts of the Navy budget--some without any indication that they are in support of training. Considerable success has been achieved in understanding how these costs have been changing over time. Separate reports have been written on the trends and composition of Navy training costs and on the development of relationships between measures of training activity and the disaggregated costs for the several components of Navy training. This report deals with the second tasking, namely the historical data base on enlisted specialized training.

Initially, the study team believed that the second objective--constructing historical information on who had been trained--would be more difficult to achieve than the first. This second objective required integrating information on training with information on the characteristics of students. Navy training data were contained in the Navy Integrated Training Resources and Administration System (NITRAS). Two data sets in NITRAS report specialized skill training: the Student Master File (SMF), which provides individual records for specialized skill training, and the Training Summary File (TSF), which provides only summary information for each course (and no identifiers for the students enrolled).

Earlier work at CNA had created a longitudinal Enlisted Master Record (EMR) file for enlisted personnel from FY 1978 through FY 1985 [1]. Individual school histories, however, remained on yearly SMF tapes (dumps of the year-end NITRAS data system) and were organized not by the students' Social Security numbers but, instead, by course data processing codes. Moreover, it was widely believed within the Navy that these data were not very reliable.

Probably because the SMF data were so difficult to disentangle, little analytic work had been done previously with them. The study team worked closely with individuals at the Management Information and Instructional Systems Activity (MIISA), who were extremely helpful during the tedious data validation and verification process.

After the SMF data had been cleaned and reorganized by Social Security numbers, longitudinal training histories for each active-duty enlisted person were constructed. Because the longitudinal EMRs are redundant, extremely large, and time-consuming to access, condensed longitudinal manpower histories for each individual were created. The longitudinal EMR history was merged with the SMF information to create historical longitudinal manpower and schoolhouse histories for each individual in the enlisted Navy between 1979 and 1985.<sup>1</sup>

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1. See [2] for EMR documentation. CNA documentation is forthcoming on SMF.

Only after the schoolhouse information was integrated with the EMR information was it possible to evaluate the quality of the NITRAS SMF data. Fortunately, the SMF data accurately reflected data found in the EMR: SMF data and EMR data show the individual in training over the same dates, and the individual's characteristics (such as Social Security number or paygrade) are the same in both files. In short, schoolhouse records matched to manpower (EMR) records make sense. It proved quite possible to construct historical series on the kinds of training being done and the characteristics of the personnel being trained.

The detailed findings of the study are contained in [3] through [5]. This final study report summarizes those findings, highlighting the more important patterns and trends.

## ENLISTED SPECIALIZED SKILL TRAINING: FY 1979 THROUGH FY 1985

### OVERVIEW

Specialized skill training is organized into three types of schools. The first, the A-schools, provide initial skill training. This training, which follows boot camp, leads either to occupational qualification (or rating) or, for GENDETS who are not strikers, to a month-long apprenticeship training course designed to provide additional skill (and to satisfy Congressional requirements for 90 days duty before leaving CONUS). C-schools provide more advanced or more specific training, often leading to a Navy Enlisted Classification (NEC). F-schools (shorter than 12 days and not NEC-related) provide functional training. The main thrust of the work in this study involved the individual record SMF data. This data set permits examination of training trends by first-term or career status and by rating.<sup>1</sup>

### TRAINING LOAD

In FY 1979, the specialized skill training load reported to the SMF was 36,226, meaning that on an average day 36,226 individuals were in training. By FY 1985, the training load (which can also be understood as the "average on board") had increased to 44,102, an increase of almost 22 percent. The average number of individuals under instruction, however, increased more sharply than the number in training (30,691 to 38,502 or a 25-percent increase). Time that is not instructional is called supernumerary. It is conventionally divided into time awaiting instruction (AI), time in interrupted instruction (II), and time awaiting transit (AT). Most of the supernumerary time is spent awaiting instruction, and proportionally more of it is done by first-termers (defined here as those with less than 4 years of service) than by careerists (4 or more years of service).

The division of students into careerists and first-termers is interesting. As the Navy has been retaining more careerists, it has also been spending more days training them. Figure 2 illustrates these

---

1. Data for the month-long apprenticeship training for GENDETS and data for about half of the F-school training days are not available on the individual record SMF data. (They are reported only as summary statistics to the Training Summary File (TSF).) F-school data were analyzed using the TSF (the TSF has summary records for the SMF data as well as for the courses that report directly to it), and the apprenticeship data were not analyzed as apprenticeship training was believed to be more like recruit training than like the other types of specialized skill training.

The SMF data contain well over 99 percent of all other enlisted specialized skill training [4].

trends for individuals in the first 4 years of service and for those with more than 4 years of service.<sup>1</sup>

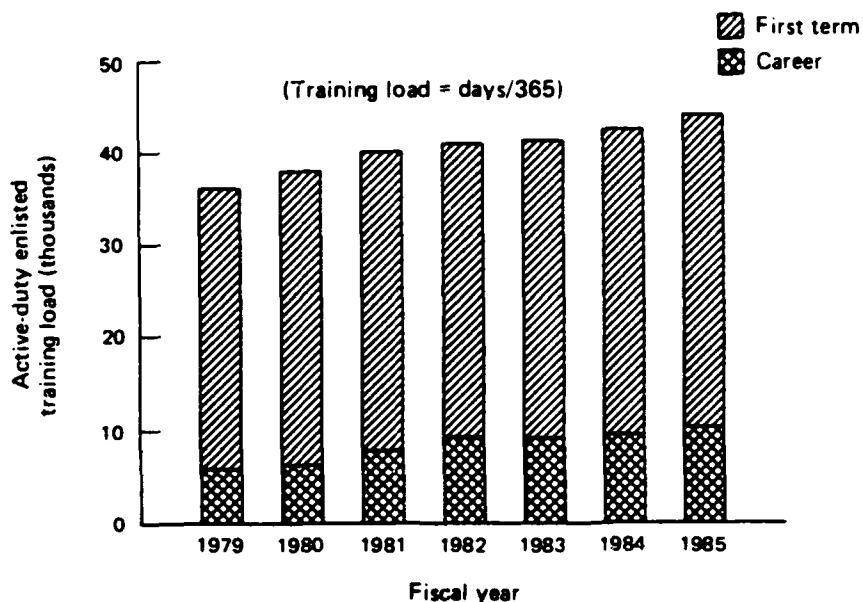


FIG. 2: SPECIALIZED SKILL TRAINING LOAD

The next step was to determine how the different types of specialized skill training (A-, C-, and F-school) were contributing to this increased training load. In 1979, A-school represented 65 percent of the specialized skill training load, C-school about 30 percent, and F-school about 5 percent.<sup>2</sup> Because the total training load increased 22 percent over the period, any school whose load increased less than 22 percent has become a less important component of training, despite the fact that it adds to the increase in training. Conversely, a school type whose training load increased more than 22 percent has become a more important component of the training load.

1. See [4] for more detailed information.

2. F-school was about 5 percent of the training load in the SMF.

(F-school is about 8 percent of the training when calculations with the non-individual level data are included.) Because F-school classes are so short, however, F-school has more individual students than either A- or C-school. Because of the differing lengths of classes in the three types of specialized skill training, calculations that report graduates or entrants by school type can be misleading indicators of the relative magnitude of Navy training.

During the FY 1979 to FY 1985 time period, the A-school training load increased 9 percent, and the C-school training load increased 51 percent. In short, the increase in C-school training accounted for the majority of the increase in training load for the period in question (about 70 percent). Figures 3 through 5 detail the data. Figure 3 illustrates the A-school training load divided into supernumerary time and instructional time. The problem with supernumerary time was most apparent in A-school in the early 1980s.<sup>1</sup> Figure 4 illustrates the increase in the C-school load and details what proportion of the change in the C-school load occurred because of a definitional change. As is clear from figure 4, the renaming of some F-school courses to C-school courses contributed only a trivial increase to the C-school training load. Figure 5 details the F-school training load, dividing it into the load reported to the TSF and the load reported to the SMF.

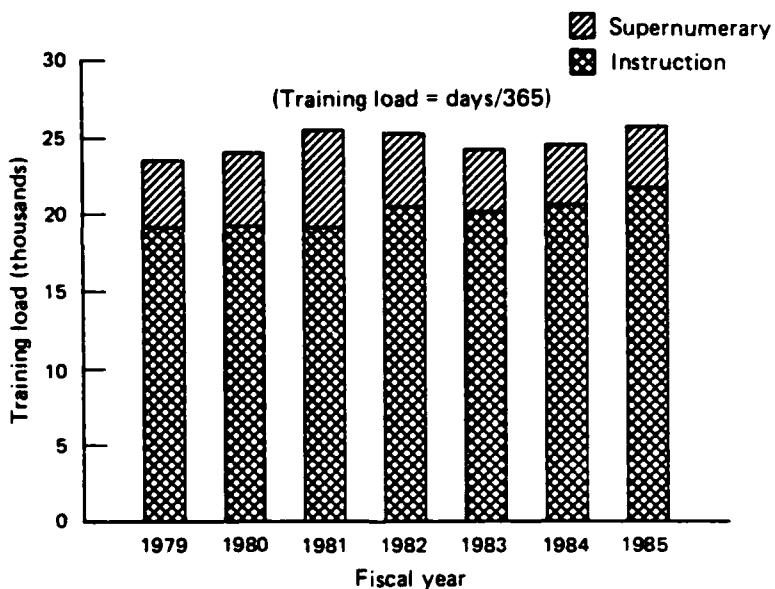
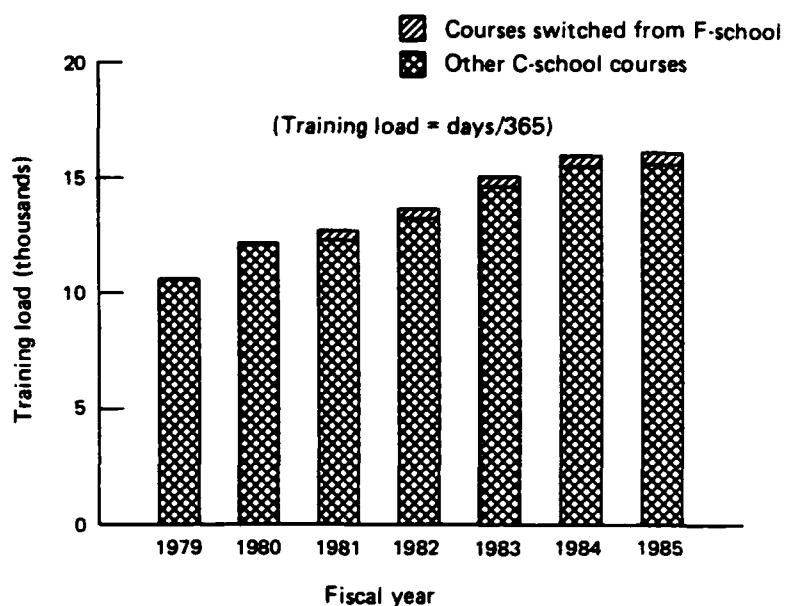


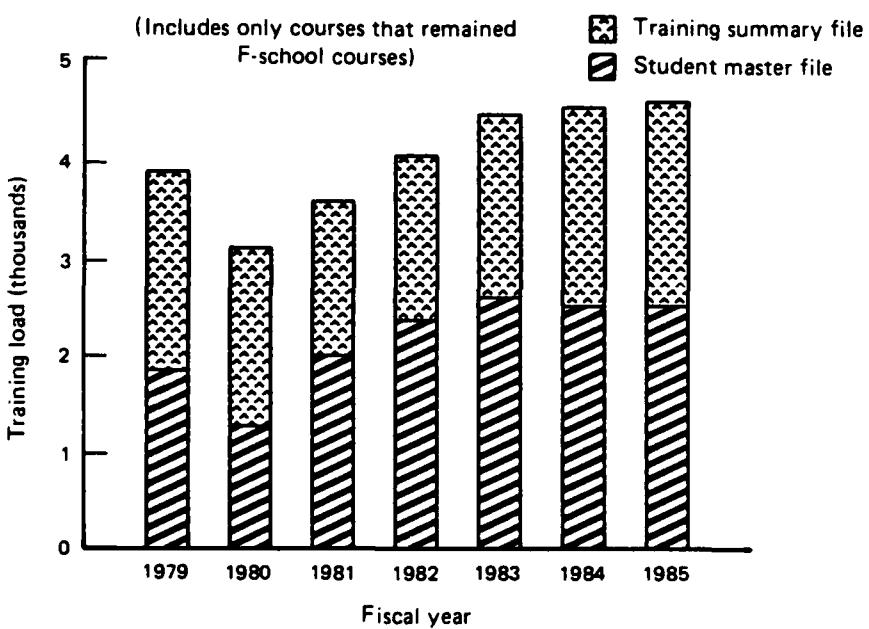
FIG. 3: A-SCHOOL TRAINING LOAD

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1. If the increase in supernumerary time in 1980 and 1981 was partly due to larger numbers of new recruits, this problem may recur in 1986 and 1987.



**FIG. 4: C-SCHOOL TRAINING LOAD (COURSES SWITCHED FROM F-SCHOOL AND OTHER C-SCHOOL COURSES)**



**FIG. 5: F-SCHOOL TRAINING LOAD**

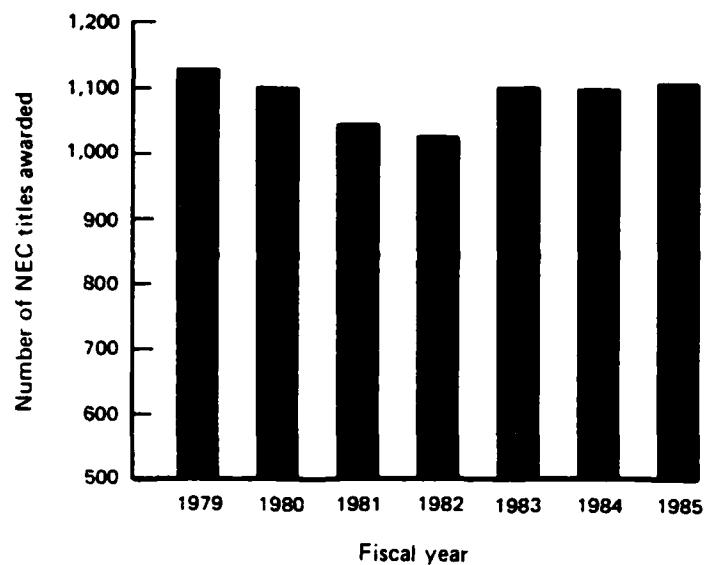
Because of the sharp growth in C-school training since 1979 (70 percent), the C-school proportion of the total load was over 36 percent in 1985. This suggested that a closer examination of C-school training was warranted. Such an examination proceeded in two main directions. First, the C-school training was examined on a rating-by-rating basis to see which ratings had most contributed to the growth in training. Detailed findings are available in [4]. As expected, the sharpest increases were in the more technical ratings. Non-mission-critical and shore ratings had small increases in C-school training over the period.

Because NECs are earned through C-school courses,<sup>1</sup> the second approach to C-school training involved a detailed examination of NECs.<sup>2</sup> Because of some concern that NECs were proliferating, the initial look was at the number of different NEC titles awarded each year. These numbers are displayed in figure 6. There does not appear to have been any trend in the number of NEC titles awarded from FY 1979 through FY 1985.

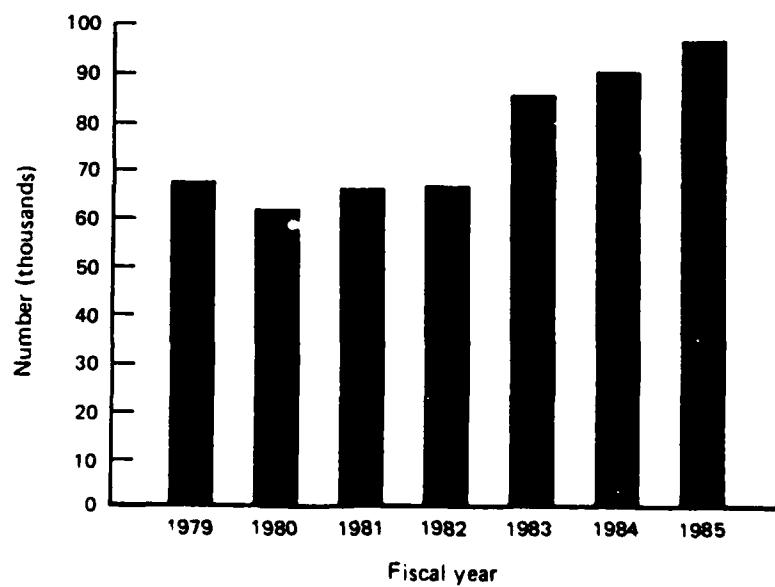
Next, the number of NECs awarded to enlisted personnel was examined.<sup>3</sup> Figure 7 illustrates the number of NECs awarded each year. The number of NECs awarded in the most recent years has been adjusted for the substantial reporting lag for NECs. An explanation of this procedure as well as detailed counts of the number of awards of each NEC in each of the years is available in [3].<sup>4</sup> As is clear from figure 7, the number of NECs awarded has increased. Because the growth rate in the number of NECs awarded between 1979 and 1985 is less than the growth rate in the C-school training load, however, either non-NEC-related C-schools have increased substantially, the NEC pipelines have lengthened, or proportionally more of the growth in the NECs has been for NECs with longer pipelines. The first alternative seems quite unlikely, but further work is needed before these phenomena can be disentangled, particularly work that integrates technology/fleet modernization with NECs and C-school training.

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1. NECs can be earned through either C-school courses, on-the-job-training, or a combination of both methods. All NEC-related courses, however, are C-school courses.
2. See [3] for more information. The NEC data come from the five NEC fields on the Enlisted Master Files.
3. Not all NECs are used to identify earned qualifications or skills. Entry series NECs are used to identify personnel about to be trained for a particular rating group (i.e., they identify the new recruits who will go to A-school). Each year there are over 40,000 of these NECs on EMR records. They have been removed from the counts here.
4. The time lag between the award date of the NEC and the entry of the NEC onto the individual's EMR record is extremely troublesome as it hampers the Navy's ability to detail personnel efficiently. Steps are being taken to speed up the procedures involved.



**FIG. 6: NUMBER OF NEC TITLES AWARDED**



**FIG. 7: NUMBER OF NON-ENTRY-LEVEL NECs AWARDED (ADJUSTED FOR NEC REPORTING LOG)**

In summary, the overall commitment to active-duty enlisted specialized skill training increased between 1979 and 1985. With this increase in inputs, an increase in costs should be expected. First, the total number of days spent by enlisted personnel in specialized skill training increased 22 percent. It increased almost 4 percent between 1984 and 1985. Second, because of increased efficiencies in A-school and because proportionally more of the training was done in C-school, proportionally more of the increase in training time was instructional (versus supernumerary). Because instructional time involves greater costs than "waiting" time, the cost of training probably increased more than the overall increase in the training load. Another reason that training costs are rising is that the Navy is training proportionally more careerists, probably because of increased retention. Because they are paid more, careerists are more expensive to train. Seventeen percent of the training in 1979 was for careerists; by 1985, the percentage had risen to 21 percent. (Between 1984 and 1985, the percentage rose from 20 to 21 percent.)

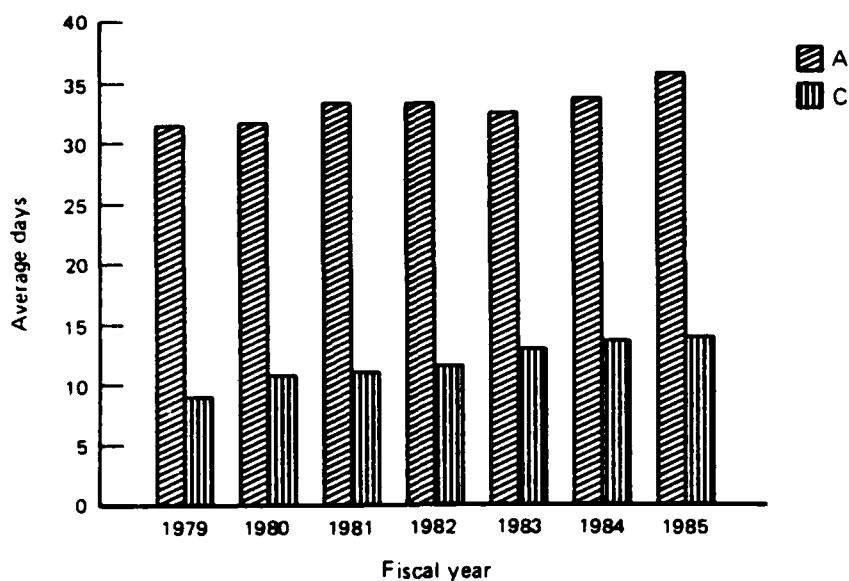
These three factors (more total time spent training, proportionally more instructional training time, and proportionally more training time for careerists) create upward pressure on training costs. Additional indicators of training costs are being reviewed. For example, the kind of training that has shown the sharpest increase is C-school training. C-school training, with its highly technical content (particularly if NEC-related), is likely to be more expensive than either A- or F-school training. Additionally, the ratings that have experienced little growth in C-school training, namely the shore-intensive ratings, are relatively nontechnical. These points suggest that cost increases will be concentrated largely in C-schools. (Specific cost/training load relationships will be covered in a separate report on Navy training costs.)

#### AVERAGE DAYS OF TRAINING

The active-duty enlisted training load reflects the average number of individuals in training at any time. This figure may be growing simply because the Navy is growing. Thus, it is also worthwhile to examine the average days in training spent by enlisted personnel in FY 1979 through FY 1985. These calculations permit a clearer look at whom the Navy has been training, primarily because the period showed an absolute reduction in the number of first-termers and a growth of almost 33 percent in careerists. Figure 8 illustrates the average days in A- and C-school training for first-term enlisted personnel. Average days in A-school increased about 14 percent (from 31.4 to 35.7 days) between 1979 and 1985. (If all the A-school courses were taken during the first year, the average first-terminer in 1985 spent 142.8 days in A-school.)

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1. It should be remembered that, for this work, first-termers were defined as those in their first 4 years of service.



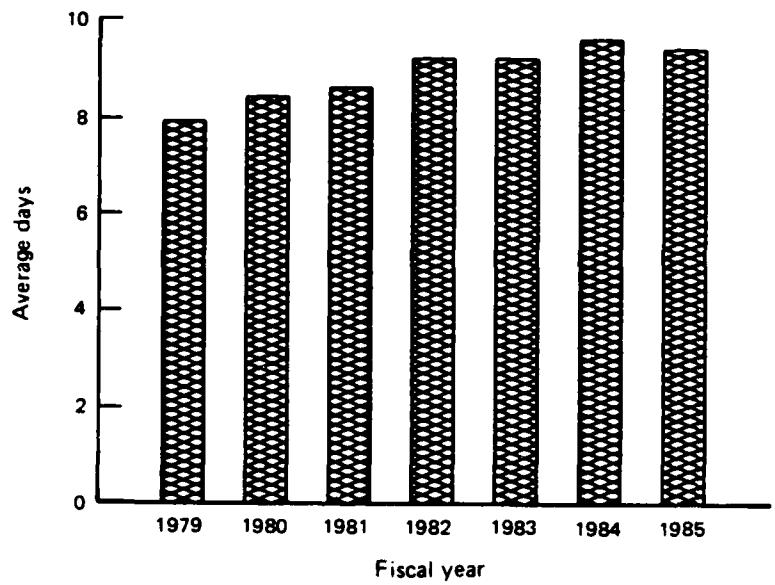
**FIG. 8: AVERAGE DAYS IN A- AND C-SCHOOL  
(FIRST-TERM ENLISTED PERSONNEL)**

Although the average number of days spent in C-school for first-terminers is substantially smaller than the average number of days spent in A-school, the growth rate for the C-school days is much larger. The number of days increased over 50 percent between 1979 and 1985 (from 8.9 to 13.8 days per first-terminer per year). The 1985 rate of C-school training suggests that during the first 4 years, 45.2 days would be spent in C-school by the average enlisted individual. Figure 9 shows the average days in C-school for all enlisted individuals with more than 4 years of service (careerists). The growth in average days in C-school has been considerably slower for the average careerist than it has for the average first-terminer (19 percent, from 7.9 to 9.4 days).

The study team was particularly interested in the fact that the first 4 years of enlisted Navy service have always involved more days of C-school training than have the later years. In 1979, those in the first 4 years of service averaged 8.9 days of C-school, and those with more years of service averaged 7.9 days. In 1985, those in the first 4 years of service had 13.8 days, and those with more years of service averaged 9.4 days.<sup>1</sup>

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1. Although outside the scope of this study, it may be worthwhile to investigate whether some of this C-school training could be postponed until after the individual had made his first reenlistment decision.



**FIG. 9: AVERAGE DAYS IN C-SCHOOL  
(CAREER ENLISTED PERSONNEL)**

## SUMMARY

Even though Navy enlisted endstrength is increasingly composed of careerists, the Navy has increased its commitment to specialized skill training. This increased commitment is reflected in increased days of training, an increased proportion of these training days becoming instructional (versus supernumerary), and an increased commitment to more expensive training (C-school). These factors all contribute to an upward pressure on the costs of Navy training. In order to identify the major factors impacting Navy training costs, these data on specialized skill training, along with other operational data, will be used to define the relationships between measures of Navy training and budgetary costs.

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- [1] CNA, Research Memorandum 84-1, "CNA User's Guide to the Enlisted Master Record," by Kevin Garvey, May 1984
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